DOCUMENT RESUME

ED 026 977 24 HE 000 771

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Undergraduate Research in Social Sciences. Final Report.
Washington and Lee Univ., Lexington, Va.
Spons Agency-Office of Education (DHEW), Washington, D.C. Bureau of Research.
Bureau No-BR-6-2049
Pub Date Aug 68
Grant-OEG-2-6-062049-2258
Note-18p.
EDRS Price MF-$0.25 HC-$1.00
Descriptors-*Educational Research, *Higher Education, Research Opportunities, Research Skills, *Seniors, Student Motivation, *Student Research, *Undergraduate Study

Ten seniors at Washington and Lee University participated in an undergraduate educational training program during the 1967-1968 school year. The program provided research training in education and the social sciences, and opportunities to work closely with experienced faculty in order to effectively formulate and clarify problems. The projects were designed to be educationally useful to the student trainees, and could be continued on an advanced level in graduate school. In a few cases, more than one trainee worked on one of the studies, which involved: the hippocampal contributions to motivational regulation in the albino rat, admission criteria and procedures in graduate schools of economics, socioeconomic mobility in Rockbridge County (Virginia), the effects of financial aid on academic achievement, the role of memory requirements and stimulus factors in paired-associate learning, local support for public education in South Carolina, the role of prison organization in the problem of re-educating the inmates, and the organization, teachers, teacher compensation and operating revenues of the Virginia public school system. The program was successful in stimulating meaningful participation in undergraduate research and in contributing new knowledge on some educational problems. The report summarizes each project and indicates how each set of findings could contribute to specific areas in the field of education. (WM)

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UNDERGRADUATE RESEARCH IN SOCIAL SCIENCES

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

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The research reported herein was performed pursuant to a grant with the Office of Education, U. S. Department of Health, Education, and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Office of Education position or policy.

Washington and Lee University

Lexington, Virginia

INTRODUCTION

Since 1960 Washington and Lee University has had a program of undergraduate research in the natural sciences, social sciences, humanities, commerce and law. This program is supported by an endowment of $250,000.00 donated by an alumnus and supplemented by gifts from the Charleston and Merck Foundations. During the first eight years of its operation, this "Robert E. Lee Undergraduate Research Program" has made possible 374 research projects involving 482 students. During the 1967-1968 year 69 students participated in 56 projects under the program. In addition, during this eight-year period other students have been supported by the National Science Foundation Undergraduate Science Education Program.

This broad program of undergraduate research has stimulated student interest in continuing research and other intellectual activities. Therefore, Washington and Lee sought support from the Office of Education to expand and upgrade its existing unique Robert E. Lee Program and in this way to offer opportunities for training in these areas to a larger number of students. Support was granted for ten trainees of demonstrated ability in the social sciences. The research activities of these trainees were in areas related to education, as is illustrated below by a discussion of the various projects undertaken.

The objective of the Office of Education training program is to give to participating students the opportunity to work with experienced professors on projects of a specialized nature, thus providing undergraduates with research experience which is usually available

only at the graduate level. Thus, students would receive while in college training in research techniques in education and the social sciences which can be continued on a more advanced level in graduate school as well as being educationally valuable in themselves.

Notification of the first year of the Office of Education Program was received after classes had been completed in June, 1966, so that it was possible in the fall to find only nine trainees who were willing and eligible to participate in the program. The results they achieved and the enthusiasm for research which the program engendered impressed both the faculty and students here so that there was greater interest in the second year's activities.

METHOD

During the spring of 1967 students who were eligible to participate in the Educational Research Training Program--those rising seniors majoring in Economics, Political Science, Psychology and Sociology who had a cumulative 2.8 average--were informed about the program. Twelve qualified students applied and from these ten were chosen on the basis of their qualifications and of the relationship to education of the projects planned. The other two students were put on the alternate list. Last year one of our students dropped out in the middle of the year but this year all ten completed the program so it was not necessary to involve the alternates. The selection of the projects and participants was carried out by the Washington and Lee Council on Research.

The students who participated in the program this year were of exceptionally high quality, as is indicated below. Table 1 gives a roster of the trainees showing for each trainee his period of enrollment and the amount of support received. Table 2 gives his college board scores, graduating average, honor achieved at Washington and Lee and post-graduate plans for these students. Only two took the graduate record examination this year. Mr. Ryan made 710 and 740 on the verbal and quantitative tests respectively. Mr. Zacharias made 540 and 640 on the verbal and quantitative tests respectively and 620 in his major, sociology.

TABLE 1

Trainee	Period of Enrollment	Amount of Support
Baugher, William Hugh	Sept. 20, 1967-June 7, 1968	$500.00
Clark, Harold Edward, Jr.	Sept. 20, 1967-June 7, 1968	500.00
Madison, James Robinson	Sept. 20, 1967-June 7, 1968	500.00
Matthews, Joseph Aubrey, Jr.	Sept. 20, 1967-June 7, 1968	500.00
Ryan, Andrew Shelton, Jr.	Sept. 20, 1967-June 7, 1968	500.00
Smith, Rutherford Paul C.	Sept. 20, 1967-June 7, 1968	500.00
Snowden, Wayne Scott	Sept. 20, 1967-June 7, 1968	500.00
Winn, Wendall Lane, Jr.	Sept. 20, 1967-June 7, 1968	500.00
Yoney, Gerald Joseph	Sept. 20, 1967-June 7, 1968	500.00
Zacharias, Richard Thomas	Sept. 20, 1967-June 7, 1968	500.00

TABLE 2

Trainee	CEEB - SAT V	M	Graduating Average (A = 4.00)
Baugher, William Hugh	689	757	3.075
Honors at Washington and Lee: Dean's List, cum laude			
Post-graduate plans: University of Virginia Medical School			
Clark, Harold Edward, Jr.	697	642	3.415
Honors at Washington and Lee: Dean's List, magna cum laude			
Post-graduate plans: Harvard Business School			
Madison, James Robinson	586	550	3.231
Honors at Washington and Lee: Dean's List, cum laude			
Post-graduate plans: Law School			
Matthews, Joseph Aubrey, Jr.	534	640	3.211
Honors at Washington and Lee: Dean's List, Omicron Delta Kappa, cum laude			
Post-graduate plans: University of Virginia Law School			
Ryan, Andrew Shelton, Jr.	683	671	3.065
Honors at Washington and Lee: Dean's List, cum laude			
Post-graduate plans: Fellowship, Washington University (Missouri)			
Smith, Rutherford Paul C.	565	635	3.065
Honors at Washington and Lee: Dean's List, Omicron Delta Kappa, cum laude			
Post-graduate plans: Navy, OCS, Law School			
Snowden, Wayne Scott	676	676	3.236
Honors at Washington and Lee: Dean's List, cum laude			
Post-graduate plans: University of California, Berkeley, Law School			
Winn, Wendall Lane, Jr.	586	661	3.218
Honors at Washington and Lee: Dean's List, Omicron Delta Kappa, cum laude			
Post-graduate plans: University of Virginia Law School			
Yoney, Gerald Joseph	586	645	2.813
Post-graduate plans: Law School			
Zacharias, Richard Thomas	579	640	3.114
Honors at Washington and Lee: Dean's List, cum laude, Honors in Sociology			
Post-graduate plans: SUNY, Binghampton, State Grant			

As can be seen from Table 2, the trainees in this year's program were very able. All but one were graduated with academic honors. Three were members of ODK, attesting to their leadership potential. Their college board SAT scores also indicate their intellectual abilities.

The projects involved several different types of research and approaches to problems. One involved the study of the effects of the hippocampus on the motivation of rats. Two trainees worked on a continuing project which involved the collection of data utilizing an extensive questionnaire and the analysis of this data with the assistance of our 1620 computer. Another involved the collection of data from local records and newspapers. Two students in psychology involved student subjects in an investigation of learning. In these studies the computer was again used in the analysis of the data obtained. Two studies involved the collection, organization and analysis of data on the public education systems in two states--South Carolina and Virginia. The South Carolina study was supplemented by direct interviews with officials in education in the state. Another study involved a consideration of university records and interviews with students. The other investigation was primarily an organization of material obtained from various library sources.

All but two of the students, Mr. Baugher and Mr. Ryan, had taken or concurrently with their research training were enrolled in one of several courses which prepared them to work quantitatively in the social sciences and which trained them in the techniques of

research. These courses are normal parts of the academic program in that field and were not a requirement for participation in this training.

The trainee's role in the various projects varied depending on the individual and the nature of the project. In most cases the trainee worked closely with the faculty member concerned in formulating and clarifying the problem to be studied. This part of the project usually involved detailed reading and discussion of the relevant literature. After the problem was well defined, assistance was given by the faculty member in designing the project. Most of the collection of data was accomplished by the trainee but some assistance was usually given in analyzing and interpreting the results. The trainees showed varying degrees of independence in working on their research projects but in most cases faculty supervision was regular and frequent. Written reports were turned in to the program director at the end of each quarter and a complete report on the entire project was submitted at the end of the year.

The faculty members in this program, in addition to the director and assistant director, were Dr. William Buchanan, Professor of Political Science, Head of the Department; Dr. David G. Elmes, Assistant Professor of Psychology; Dr. Edwin C. Griffith, Professor of Economics, Head of the Department; Mr. John M. Gunn, Jr., Associate Professor of Economics; Dr. Dulon D. Hughes, Assistant Professor of Political Science; Dr. Emory Kimbrough, Jr., Associate Professor of Sociology, Head of the Department; Dr. James G. Leyburn,

Professor of Sociology; Dr. Edward L. Pinney, Associate Professor of Political Science; and Dr. J. B. Thompson, Associate Professor of Psychology. Doctor Elmes and Doctor Griffith each directed the projects of two students. Doctor Kimbrough and Doctor Leyburn shared the direction of one of the projects. The trainees, of course, received assistance from other faculty members and several educational officials and organizations not connected with the University.

RESULTS

All ten students who began the program in September completed the year. One of them, Mr. Zacharias, worked on his training project as part of his Honors work in Sociology. The Honors Program requires that a Senior Thesis be written in lieu of taking one formal course during the spring semester. The other nine students also prepared comprehensive reports at the conclusion of their projects for the project directors. A brief abstract of each of their projects is given below. Mr. Clark and Mr. Winn worked on the same project so their reports are combined in one abstract.

BAUGHER. *Hippocampal Contributions to Motivational Regulation in the Albino Rat.*

This project is part of a long-range program planned to explore the general motivational processes and their relation to hippocampal function in the rat. This particular phase of the program dealt with a comparison of the sensitivity to quinine adulteration of their food in normal and hippocampal lesioned rats.

CLARK and WINN. *Admission Criteria and Procedures of Graduate Schools in Economics.*

The purpose of this project was to find what American graduate schools offering the Ph.D. in economics require and recommend for admission. A similar study involving political science was completed last year, using the same six-page questionnaire. This questionnaire was submitted last year to the Office of Education for approval. Ninety-seven institutions were sent questionnaires. Ninety-two of these replied. The percentage of response was about the same as to the political science questionnaire. The response was about the same for those departments rated as high in prestige by Cartter's 1965 report as from those departments rated low in prestige.

The areas in which the questionnaire sought information include requirements as to degree, major, standardized tests, tools of scholarship (language, mathematics) and undergraduate preparation. Other information sought included questions about admission policies, costs, scholarships, and numbers of students and graduates.

The aims of this project were to assist the Department of Economics in curriculum planning, to assist students in preparing themselves for graduate work, and to get an overview of graduate departments of economics.

The responses to the questionnaires have been processed and analyzed by using a program devised for this project for the computer. A comparison is being made between this study and the similar political science study carried out last year. A report of the findings of this study at a national or regional meeting is planned.

This project was directed by Professor John M. Gunn, Jr., Associate Professor of Economics and Professor William Buchanan, Professor of Political Science.

MADISON. *Socioeconomic Mobility in Rockbridge County.*

The primary aim of this project was to determine what degree of long-range socioeconomic mobility there is in Rockbridge County, Virginia, and those factors or variables which place a person in a low, middle, or high socioeconomic bracket and which help or hinder his chances of moving up the ladder of greater income and social status. It was found that the research time needed to arrive at legitimate conclusions exceeded that available in one academic year. A start was made on the problem, however. The names of all the children in the first grade of Rockbridge County in 1934-1935 were obtained. This list includes 550 names. Data including date of birth, parents' names and addresses, school or schools attended, year of school completion, attendance record, grade average, as well as several factors relating education and economic status were obtained for each of these persons and listed on individual cards.

These names were checked against the Rockbridge County Welfare Office's master file to determine which members of the sample were ever on the welfare rolls. Approximately 140 names in the master file correspond to names in the sample.

The data collected will be used to complete the study and as the basis for other projects in the fields of sociology, economics and political science.

Dr. Delos D. Hughes, Assistant Professor of Political Science, directed this project.

MATTHEWS. *Effects of Financial Aid on Academic Achievement.*

This study began by showing there is no significant correlation between the financial need and the academic achievement, as measured by grades, of Washington and Lee students. This lack of correlation was attributed to other factors than motivation but no accurate measure of motivation could be set up.

The problem of academic motivation was investigated utilizing library sources and interviews with students. (Mr. Matthews was a dormitory counselor to freshmen so was able to carry out his interviews in an informal and friendly atmosphere.) The two factors which seem to influence motivation are a high general need to achieve and a strong desire to attain a set goal. Both of these factors were found to occur more frequently in students with economic need than in those students who experience no need.

A corollary to this study was an investigation of the effectiveness of high school guidance systems in bringing to the attention of students with financial need the opportunities to secure assistance in order to attend college. The preliminary results of this phase of the project indicate that inadequate and insufficient information is available to needy students in the Virginia public school system.

RYAN. *The Role of Memory Requirements in Paired-Associate Learning.*

A thorough literature search emphasizing subject matter on short-term memory has been made. A series of experiments, using students as subjects, were carried out. Each subject was asked to memorize 16 groups of pairs of common English words (about six pairs to a group) and to recall the words at various points in the experiments. The experiment was set up so that a crucial variable--the amount of material a person is trying to remember (called "storage load")--is effectively isolated. The results upheld, in a statistically significant manner, the hypothesis that the ability to recall varies inversely with the amount of storage load. An article partially based on this research has been accepted for publication by the *Journal of Experimental Psychology*.

Dr. David G. Elmes, Assistant Professor of Psychology, directed this project.

SMITH. *Local Support for Public Education in South Carolina.*

The purpose of this study was to determine what economic, demographic and socio-political variables affect the support of public primary and secondary education in each South Carolina county and to obtain a general picture of the public school finance program in South Carolina. Variables suggested by G. W. Fisher in *Interstate Variation in State and Local Government Expenditure* were related to support measured in terms of "local funds per pupil for education purposes." The following variables--(1) population per square mile, (2) percentage increase in population, 1950-1960, (3) percentage urban population, 1960, (4) percentage of families with less than $3,000.00 income, 1959, and, (5) percentage population over 25 with less than five years' schooling, 1960--gave a good indication of support. Other variables--(a) non-white population, (b) sound housing units, and, (c) houses with television--were also tested for use in predicting support. Only the inclusion of (b) with the other factors increased the effectiveness of prediction. Using these six variables, agreement with support levels was found in 55 per cent of the cases. Selected counties with various levels of support were then investigated by interviewing the county superintendent of schools and/or educational officials. In some counties local support was low because of the population's *unwillingness* to pay high taxes; in others, the lowness of revenue is due to the inability of the county to pay higher taxes. The percentage of personal income spent for education in South Carolina has decreased from 5.0 to 4.2 per cent in the past decade.

This project was supervised by Professor Edward L. Pinney, Associate Professor of Political Science.

SNOWDEN. *Stimulus Factors in Paired-Associate Learning.*

Following a thorough literature search, an experiment concerned with methods of paired-associate items was undertaken. The trainee conducted the experiment and thereby was thoroughly familiarized with research techniques in the area of human verbal learning. This experiment examined the efficacy of immediate knowledge of results in verbal learning. It was found that in certain circumstances immediate knowledge of results may be detrimental to efficient learning.

In a second series of experiments, the role of the categorical membership of words in the learning and organization of information was examined. Subsequent to a literature review, the trainee conducted experiments. These studies employed a method of testing the subjects different from the procedure used in the first experience. Thus, the trainee gained further experience in the investigation of verbal learning.

This work was supervised by Dr. David G. Elmes, Assistant Professor of Psychology.

YONEY. *The Virginia Public School System: Its Organization, Teachers, Teacher Compensation, and Operating Revenues.*

The trainee collected, researched, catalogued, compared, and analyzed materials relating to the public school divisions in the State of Virginia in these areas. His study included the organization of the Virginia Department of Education, the qualifications demanded for Virginia's teachers, teachers' salaries and the change in teachers' salaries, and the revenues received by Virginia's school districts from various sources.

The standards for the various kinds of teacher certification in Virginia were reported. The percentages of teachers meeting each of these standards in each school district were obtained. A complete breakdown on salary scales for each school district was given, including fringe benefits, extra pay for extra duties, as well as leaves of absence regulations. The amount of support the public school districts receive from local, state, and federal funds was reported. The methods used in approving the school budget were discussed, as well as the tax sources from which these funds were raised.

ZACHARIAS. *Prison Organization: A Problem in Re-educating the Inmates in the Total Sense.*

This study investigated prison organization historically and as it exists today. Its purposes were to present the different types of organizational structures found in prisons, to explore the ramifications of the various structures on rehabilitation programs, and to assess their effectiveness in caring for the inmate and re-educating him so that he might assume a responsible role in our society. It was clearly shown by this study how the three hierarchies for keeping, using, and serving the inmates emerged historically and that they do exist in the formal organizations of most prisons at the present time. Each hierarchy has been shown to place emphasis on a different type of power. The study has also indicated the resulting chaos in prison administration and its effect on the success of various rehabilitation programs.

The trainee concludes as a result of this investigation that the treatment-prison should and will be adopted for the future. Such a prison would have the goal of rehabilitating or re-educating the inmates in the total sense. It would place the emphasis on the exercise of normative power. A change of attitude of the general public is needed if legislators and prison administrators are going to take necessary steps to create treatment prisons.

This research was supervised by Dr. James G. Leyburn, Professor of Sociology, and Dr. Emory Kimbrough, Jr., Associate Professor of Sociology.

DISCUSSION

The second year of Washington and Lee University's Office of Education Undergraduate Educational Research Training Program has proceeded more smoothly than the first. The results show that it has been successful in achieving its objective of stimulating student research training in the social sciences, particularly in areas related to education. This program enabled ten students to gain experience and training in research techniques. Only one of the students had signed up for Honors work so that the other nine would not have been involved in research if this Program had not been offered. The trainees each showed a sense of achievement resulting from this participation in an Office of Education sponsored program.

The objective of every research program must be the discovery of new knowledge and new understandings. Each of the projects made a contribution to this aim. The three studies in psychology--one on the effects of the hippocampus and the two on learning--gathered data of importance to the development of hypotheses and theories in these areas. The acceptance of the results of one of these projects by the *Journal of Experimental Psychology* for publication is evidence of its merit. The award of Honors in Sociology to Mr. Zacharias indicates that his researches met this objective in the eyes of the Sociology faculty. Other papers or publications may result from these projects, for in several cases the academic year allowed time only for the basic work to be accomplished.

These projects are of practical use, too. The studies of the financing of primary and secondary education in Virginia (Yoney) and South Carolina (Smith) provide information for those who would understand and improve these school systems. The studies of Clark and Winn on the graduate school requirements for economics will be of great assistance to the students and faculty of the School of Commerce and Administration and particularly to the Department of Economics at Washington and Lee in planning their curricula and courses. Matthews' investigation of financial aid will be helpful to the Director of Financial Aid here and indirectly to those students seeking such aid throughout the country. This problem is of especial interest in Virginia since we have one of the lowest percentages of secondary school students who continue to college.

This training program has provided benefits for education, too. Each study was related to some educational problem but even more important, ten young men of outstanding abilities have been made aware of the problems associated with education in our region and our nation. Although very few of them may go into education as a profession, the trainees are the kinds of students who are likely to become leaders in their communities. Most of this group of trainees plan to become lawyers. This early introduction to some of the problem areas in education will be of assistance to them in understanding the educational systems in their own communities and has increased their interest in and enthusiasm for bringing about improvements in these areas.

Washington and Lee University benefited from the program, too. Sixty-nine students took part in our own R. E. Lee Research Program

during the past year in addition to the ten participating under the Office of Education Grant, raising the total involved in funded research to 79. The Office of Education Program was particularly helpful in strengthening research in the social sciences. Last year's research training program provided the stimulus for several projects in the social sciences carried on this year under the R. E. Lee Program. It is expected that although we will have no Office of Education Program next year, the excitement which this program has produced in the past two years will continue to inspire additional projects in the social sciences.

Some mention should be made of some of the difficulties of the program. This year we had at least two more qualified trainees than we had positions for. It is hoped that in the future it will be possible for the Office of Education to fund this program again. The quarterly reports were quite effective in keeping the program director informed of the progress of the trainees. In some cases even more frequent reports might be required.

The most impressive outcome of the program was the enthusiastic student reaction it produces. The quality of the students taking part, their interest in the problems of the social sciences applied to education, their vigorous participation in the research projects, and the results of their projects testify to the importance of this program.

CONCLUSION

The second year of the Undergraduate Training Program supported by the Office of Education, Bureau of Research, at Washington and

Lee University was effective in (1) training the students involved in the research techniques of the social sciences; (2) obtaining and analyzing information to produce new understandings and knowledge of certain educational problems; (3) introducing ten trainees to problems in the field of education; (4) strengthening research in the social sciences at Washington and Lee; and, (5) producing a group of men who are and will be concerned and informed about important educational problems.

SUMMARY

This report outlines the training of ten undergraduates in research techniques in education and the social sciences by giving these trainees the opportunity to work with experienced professors in these fields. The following projects were undertaken: a study of the hippocampal contributions to motivational regulation in the albino rat; a study of admission criteria and procedures in graduate schools of economics; a study of socioeconomic mobility in Rockbridge County; a study of the effects of financial aid on academic achievement; studies of the role of memory requirements and stimulus factors in paired-associate learning; a study of local support for public education in South Carolina; a study of the organization, teachers, teacher compensation and operating revenues of the Virginia public school system; and a study of the role of prison organization in the problem of re-educating the inmates. Each of these studies is summarized briefly. The results of this program indicate the effectiveness and usefulness of undergraduate research training.